

ArcGIS Improves How You Use Imagery

Imagery is a central component of ArcGIS. ArcGIS 10 provides many new image capabilities, such as on-the-fly processing and enhancement tools, making it easier for you to view and work with images.

<http://video.esri.com/watch/137/arcgis-improves-how-you-use-imagery>

Video Transcription

00:01 Imagery is one of the vital components that you all work with on a day-to-day basis.

00:05 Let's take a look at first how you use it and how we've improved some of the functionality and made it core at this release.

00:14 You use imagery in a number of ways.

00:18 As a basemap, you've had to bring together those different image sets and bring those into a series...

00:24 ...so you can have a basemap for functionality and distribute that out.

00:28 You've been doing different types of analysis for change on that because you've been gathering imagery over time in your...

00:36 ...area of interest, so you could look at things like land use and land cover or changes in...

00:43 ...high-quality farm landscapes within the urban fringe and be able to detect those changes.

00:48 You've also been wanting to do or are doing a more complex kind of things with imagery.

00:54 And that's like training a location or training an image for wetland delineation and...

00:59 ...combining that with different types of information such as soil attributes or other criteria that can...

01:09 ...be used to help you identify those high-quality wetlands.

01:13 Finally, many of you have talked to me or my colleagues about data management.

01:18 Imagery is perhaps the largest volume content that goes into your GIS system that you're trying to maintain.

01:27 And how can you better leverage the services that you have.

01:32 Do you have to do conversions in order to do analysis on that.

01:36 I think what you'll be seeing here within the 10 release will change how you store and manage that.

01:42 And we'll take a look at that as well.

01:47 So what are some of the capabilities or new capabilities we have within ArcMap?

01:53 We have the ability to do visualization and editing.

01:57 So there's an Image toolbar now available, Image Analysis toolbar, that allows you to do various things that you...

02:04 ...would have to do previously outside of the system.

02:06 Things like doing some...color share...or...no...excuse me...sharpening the image.

02:13 Being able to change the contrast. the conditions, do some transparency on that.

02:20 Improve the use of what you have by utilizing those tools.

02:24 And also be able to edit the imagery that you have.

02:30 You have the ability to do different types of analysis now within the [ArcGIS] system.

02:33 And that includes classification of the images that you have.

02:38 Or take advantage of advanced analysis by some of our business partners, such as BAE, or PCI, or ITT Vis.

02:50 Finally, you have the ability to do on-the-fly processing of that information.

02:54 So you can bring in images in different content or resources and be able to quickly utilize those within your desktop.

03:03 This is the area where my clients in the state have asked our assistance quite a bit.

03:09 It's how we look and, how do you manage imagery.

03:13 Because let's face it...a lot of the data imagery that you have is over different time frames...

03:19 ...and different formats and scales, but you need to create a process to collect and...

03:25 ...visualize that information quickly and easily.

03:30 And you also need to be able to look at this or have the ability to take the information in its native format...

03:36 ...and be able to combine that with other image services that you have.

03:41 Dynamic mosaicking at the 10 release allows you to handle all of these things I just described...

03:48 ...as well as the time feature.

03:51 So with that, we'd like to be able to demonstrate that...

03:57 ...the visualization and then we can go into the data management concepts.

04:04 So if we can switch to Katja's machine.

04:07 So what we see in here is a very high-quality image of an area in New Zealand.

04:14 And what I want to show you is how you can actually make this image look even better using the new Image Analysis tools.

04:24 So let me zoom in to a particular area in here, and you can see the image looks pretty good.

04:30 So let me open the Image Analysis window.

04:34 And what I have in here is actually two layer files that are pointing to the same source.

04:43 So let me just grab the Swipe tool and show you that these two images right now are the same.

04:49 What I want to do is I want to make some changes to one of them to see if I can make this image look a little bit better.

04:57 And so I want to change the contrast.

05:00 I'll change the gamma parameter, and most importantly I will change the stretch on this image.

05:09 And now if I use the Swipe tool, you will see the difference in imagery.

05:17 Pay attention to this big white building in the center; you can see that the image was taken from the side.

05:24 And if I swipe the enhanced image out of the way, you cannot really see the windows and balconies on the side of the building.

05:32 And now you can. And now you can't, and now you can. Okay?

05:38 So the image looked really good to begin with, but in reality there was a lot of whitewashing by the urban area...

05:45 ...the cement and the buildings that we had in there.

05:48 And we were able to make those changes on the fly by pointing still to the same imagery...

05:54 ...but changing some of the display parameters.

05:58 Now let's move to a different area here.

06:02 And let's take a look at the next enhancement, which is the changes to imagery that allow us to see the imagery through time.

06:13 I'll open the Time slider, and this collection of imagery...it displays as a single image in the table of contents.

06:22 But it actually is a collection of imagery, and we can view it through time right now.

06:27 It is time enabled, so take a look at this airport right here.

06:31 And in the end of 2006, there were no major buildings in the airport and there were no

jetways.

06:38 If I move to the next period in time, you can see the changes in the imagery.

06:43 And then for the following period, the airport is pretty much built out already.

06:47 But we do have some changes happening on this field next to the airport.

06:53 So we have now added the ability to see the imagery through time, basically we time enable the imagery...

07:02 ...if you have such collections available to you.

07:06 So, so far what I've shown you is the ability to visualize the imagery.

07:13 But really the power of imagery comes from all the information that is stored within those pixels.

07:20 And we need the ability to get at that information, so to analyze the imagery.

07:26 So what you see on the screen right now is a DigitalGlobe image that consists of 8 bands.

07:34 And I've got one band turned on, so I've got black-and-white imagery.

07:37 So what I want to show you is, first of all, let's go ahead and create an RGB image.

07:43 So we're going to combine red, green, and blue to create that image.

07:48 And now, within the processing part of the Image Analysis dialog...

07:54 ...I can just combine the bands and see this different combination of imagery.

08:00 I've done, ahead of time, this kind of combination, so let me turn off this image here.

08:08 And now we're looking at coastal and mineral combinations, so bands 8, 4, and 1.

08:15 We...also can take a look at vegetation health, bands...7, 6, and 5, as well as natural color...

08:22 ...which is the RGB image.

08:26 So now, what I'd like to show you is how you can collect some samples to classify this image.

08:34 So I have this Classification toolbar in here, which is part of the Spatial Analyst extension.

08:42 And I want to go ahead and collect some water samples.

08:46 So I'll try to collect the water samples for a similar type of water around here and...

08:56 ...try to be careful not to pick up any of the clear water.

09:00 And so now, I can take a look at the samples that I have collected.

09:06 I can combine them into one sample, change the color of it, this is a water sample.

09:17 And another thing that I've done ahead of time, now that you've seen me collecting the

sample...

09:22 ...it looks like that color is actually kind of hard to see, so let's do a...little bit different color.

09:29 I also created some samples ahead of time, so let's load these training samples for other types of pixel values that I have in the image.

09:38 So now I've got a different type of water, this clear water, that I have, as well as forest bare earth vegetation and urban areas.

09:50 And let's go ahead and generate a scatterplot chart to see the...degree of separation between those samples.

09:58 So what I'm looking for in here is, for the 3 bands that I'm looking at, I want to make sure that my brown and my yellow...

10:07 ...and my green are not on top of one another.

10:11 So that is going to ensure that I have good separation within my samples.

10:16 So I don't want part of my water sample to be on the land, basically.

10:21 Because if I do that, then it's not going to be able to classify the image very well.

10:26 So it looks like I've got that good separation, so let's go ahead and do interactive supervised classification...

10:34 ...and see if we can pick up this bay area and the rivers and other features.

10:42 So here we have the results, and you can see the water and the little islands and the urban areas was picked up relatively well.

10:52 And some of you saw that I did get a little bit of lack of separation in my samples.

11:00 But what I can do is actually, let's swipe this layer that I just created, out of the way and see...

11:10 ...you can see this runway near the Queenstown airport, and I was able to get that within my classification.

11:19 So I got the data that is part of the imagery, and I created new features using that data within the imagery.

11:30 So we're moving on to management?

11:33 Yeah, as you're...okay...switching between that, I think you can see the value of having those...

11:38 ...tools available right in the desktop.

11:40 I mean, imagery is now core for ArcGIS 10, and how you can process that and gain value by doing that within the system.

11:49 And be able to do the changes and actually do analysis, I think that's a pretty neat tool, actually, to begin taking advantage of.

11:58 Now let's go into the section on data management. So let's...

12:01 Yeah, so let's take a look at how these imagery definitions are being stored.

12:08 And here I am showing you a different area again in New Zealand; this is Wellington.

12:14 And I have the imagery from ArcGIS Online in here, as well as the street data.

12:20 And I have created a catalog, okay, so...these individual tiles, and I have put them together, created a mosaic.

12:29 And I didn't finish creating it so I can show you how we can do that, so we'll add those two missing images in the demonstration.

12:39 So the imagery is stored on disk, but the definition of how I am mosaicking this together, what I'm using for the Stretch function...

12:52 ...is stored within the geodatabase.

12:55 And some of you are probably familiar with raster catalogs and raster datasets that we could store inside the...

13:02 ...geodatabase prior to release 10.

13:06 Well...we combined those together and came up with a different type of object that you can store in the geodatabase...

13:14 ...that gives you some additional functionality on top of that, and that is the mosaic dataset that I think Tony mentioned earlier.

13:23 So let's take a look at the mosaic dataset.

13:26 So this is the mosaic dataset that we're looking at, okay?

13:31 Stored inside the geodatabase, the actual data, though, is stored inside the Data Wellington folder.

13:37 So I don't have to store the whole...data inside the geodatabase...just the definition.

13:43 So let's take a look at this definition file.

13:45 I'll go to properties of it, and there is a number of functions that are part of this dataset.

13:52 So I have the Stretch function, and I have the Mosaic function.

13:56 Now what I want to do is I want to clip this area using the coastline, so let's add another function.

14:06 So I can insert a function, and this is the number of functions available to you out of the box.

14:13 So let's do Clip, and I want to select the coastline, and I want to use the input geometry to clip my mosaic dataset.

14:25 So I'll click OK, and it is making changes, and you can see that now the raster shows up only

inside that polygon that I used.

14:35 So I didn't remove those pixel values, though, I'm just hiding them.

14:39 So that's just one of the functions; now I have three functions that are available inside the mosaic dataset.

14:45 I've got Stretch, I've got Clip, and I've got Mosaic, okay?

14:49 So now let's take a look at how we can add those missing rasters to the dataset.

14:55 In this case, I'm going to again right-click on the mosaic dataset, and I'm going to add rasters.

15:01 And this is a geoprocessing tool, so just like any geoprocessing tool, you can run it or you can schedule it.

15:10 Run it whenever you'd like. You have the ability here to select as input a file or a workspace.

15:17 So I'll choose the workspace, 'cause I'm adding more than one file.

15:21 Let's navigate to this workspace, and this is the area where I'm storing my files.

15:29 So again, they're not stored inside the geodatabase, they are stored on disk.

15:34 I am not going to be creating service overviews.

15:39 Service overviews are similar to pyramids for rasters, and what they are is lower-resolution copies of the data.

15:47 And so when I am zoomed out, I don't want to bring over the actual pixel values and then have my display...

15:54 ...in this case, ArcMap, resample the data; that takes a long time, and it takes a long time to get those original pixels.

16:02 So what I want to do instead is create the service overviews.

16:06 But they do take a little bit of time to create.

16:09 So I'm going to uncheck that and we'll see the results once we zoom in tight enough to see original pixels.

16:16 You can see on the bottom right here that my script was running and it was running as a background geoprocessing script.

16:24 And we'll see more of that in a second, so actually, after lunch we're going to...take a look at background geoprocessing.

16:32 So it finished; it added successfully; so now let's go ahead and zoom in tight enough.

16:39 Again, you don't see anything actually having changed, because we're still looking at service overviews.

16:45 So let's zoom in tight enough where the actual raster is showing, and you can see that I've got

raster showing up.

16:52 Now if I go and restart my service, then I'll be able to see those changes in the Web application as well.

17:03 So if I zoom or pan, as soon as that service definition has been refreshed...

17:13 ...you can see those changes in the Web application right away.

17:16 And if I zoom in tight enough here as well, we'll be able to see the new image.

17:21 So with that new mosaic dataset, you have the ability to continue storing your imagery where you want but...

17:28 ...add those functions that are being processed on the fly, to change the view of the image that your users are seeing.

17:37 And you can distribute that to a variety of users, ArcMap, Web clients, and so on.

17:44 Okay, Tony, back to you. Okay, thank you.

17:46 So with that and, Katja, you have the ability to store things in this native format without converting it over.

17:53 And I think that's an important note to take away from.

17:57 That image processing and the services that are available are here within the desktop and within [ArcGIS] Image Server.

18:04 So take a look at that, it's part of core, we want you to understand that imagery is important.

18:09 It is important to...have those features within the desktop to take on.